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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/656,713	09/07/2000	Tsuyoshi Moriya	Q60775	2126

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Sughrue Mion Zinn Macpeak & Seas PLLC
2100 Pennsylvania Avenue N W
Washington, DC 20037-3213

EXAMINER
KIBLER, VIRGINIA M

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 08/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/656,713	MORIYA ET AL.	
	Examiner	Art Unit	
	Virginia M Kibler	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-102* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-102* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 September 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2,4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 23-29, 51-53, 55-57, 74, 76-79, 96-98, 100, and 101 are rejected under 35 U.S.C. 102(e) as being anticipated by Uesugi et al. (5,870,189).

Regarding claims 23, 51, 74, and 96, Uesugi et al. ("Uesugi") discloses monitoring a size of a particle including a laser beam source 11 which radiates a laser beam to an area in which particles exist (Col. 5, lines 34-39), a photodetector 13 which receives the laser beam having been scattered by the particles, and outputs image data including brightness of pixels, an area detector 14 which detects pixels corresponding to an area on which the scattered laser beam is incident based on the image data (Col. 5, lines 39-43), and from the image data measures a relative size of the particles (Col. 5, lines 43-49). Uesugi discloses measuring an intensity based on brightness of the pixels detected by the area detector (Col. 5, lines 39-41) and measuring a relative size of the particles based on the intensity of the scattered laser beam in accordance with an equation which defines a relation between an intensity of a scattered laser beam and a relative size of particles (Col. 7, lines 14-16).

Regarding claims 24, 52, 76, 97, Uesugi discloses determining a threshold brightness to which brightness of the pixels are to be compared (Col. 5, lines 41-46), judging whether a brightness of a pixel is equal to or greater than the threshold brightness (Col. 7, lines 49-58), and determining pixels located adjacent to each other among pixels having been judged to have a brightness equal to or greater than the threshold brightness, as pixels corresponding to an area on which a laser beam scattered by a particle is incident (Col. 9, lines 40-58).

Regarding claims 25, 53, 77, and 98, Uesugi discloses the particles are generated in fabrication of a semiconductor device and includes a measurement unit that judges whether the relative size of the particles is greater than a predetermined threshold size in order to judge whether the particles would exert harmful influence on a semiconductor device and ceases fabrication if the relative size of the particles has been judged to be greater than a predetermined threshold size (Col. 6, lines 56-67).

Regarding claims 26 and 55, Uesugi discloses a scanner which scans the laser beam emitted from the laser beam source (Col. 7, lines 23-28).

Regarding claim 27, Uesugi discloses the photodetector including a CCD camera comprised of a plurality of light-receiving devices arranged in a matrix (Col. 6, lines 40-50).

Regarding claims 28, 56, 78, and 100, Uesugi discloses including a particle counter (Col. 6, lines 48-50) which entails counting up each time the particle counter receives a signal from the area detector and transmits a signal indicative of a count to the measurement unit (Col. 6, lines 51-60).

Regarding claims 29, 57, 79, and 101, Uesugi discloses calculating the size of a particle (Col. 7, lines 14-16) in accordance with the equation of Rayleigh scattering (Col. 6, lines 15-32) and a threshold size to which a calculated size is compared (Col. 6, lines 56-60).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 30, 58, and 102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uesugi et al. (5,870,189) as applied to claim 29 above.

Regarding claims 30, 58, and 102, Uesugi discloses comparing the size of a particle to a threshold size in order to control the operations of the wafer processing (Col. 6, lines 51-60). Uesugi does not appear to specify the threshold size being equal to or smaller than a minimum diameter among diameters of wirings in a semiconductor device to be fabricated. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the threshold disclosed by Uesugi to explicitly state a specific threshold as a design parameter.

5. Claims 31, 54, 75, and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uesugi et al. as applied to claim 23 above, and further in view of Comita et al. (6,368,567).

Regarding claims 31, 54, 75, and 99, Uesugi does not appear to recognize including a heater. However, Comita et al. ("Comita") teaches that it is known to include a heater for

heating a chamber to remove by-products from the chamber (Col. 3, lines 22-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the chamber in which the particles are generated as disclosed by Uesugi to include a heater, as taught by Comita, in order remove wafer processing by-products (Col. 3, lines 23-24).

6. Claims 1-7, 9-13, 15-21, 32-35, 37-45, 47-50, 59-63, 65-67, 69-73, 80-83, 85-91, and 93-95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uesugi et al. (5,870,189) in view of Yamaguchi et al. (5,929,980).

Regarding claims 1, 32, 59, and 80, Uesugi et al. ("Uesugi") discloses monitoring a size of a particle including a laser beam source 11 which radiates a laser beam to an area in which particles exist (Col. 5, lines 34-39), a photodetector 13 which receives the laser beam having been scattered by the particles, and outputs image data including brightness of pixels, an area detector 14 which detects pixels corresponding to an area on which the scattered laser beam is incident based on the image data (Col. 5, lines 39-43), and from the image data measures a relative size of the particles (Col. 5, lines 43-49). Uesugi discloses detecting the brightness of the pixels which corresponds to the intensity of the scattered light and comparing it to a predetermined threshold to determine the relative size of the particles (Col. 5, lines 41-49). Uesugi does not appear to recognize including a maximum brightness detector. However, Yamaguchi et al. ("Yamaguchi") teaches that it is known to use the maximum intensity detected among the pixels detected by the area detector from the photodetector to measure a relative size (Col. 14, lines 46-64). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the detection of the brightness of the pixels disclosed by Uesugi to include determining the maximum brightness, as taught by Yamaguchi, as an

alternative method of determining the relative size of the particles from the output of the photodetector.

Regarding claims 2, 33, 60, and 81, Uesugi discloses determining a threshold brightness to which brightness of the pixels are to be compared (Col. 5, lines 41-46), judging whether a brightness of a pixel is equal to or greater than the threshold brightness (Col. 7, lines 49-58), and determining pixels located adjacent to each other among pixels having been judged to have a brightness equal to or greater than the threshold brightness, as pixels corresponding to an area on which a laser beam scattered by a particle is incident (Col. 9, lines 40-58).

Regarding claims 3, 34, 61, and 82, Uesugi discloses measuring an intensity of the scattered laser beam based on the brightness and measuring a relative size of the particles based on the intensity of the scattered laser beam (Col. 7, lines 11-16) in accordance with an equation which defines a relation between an intensity of a scattered laser beam and a relative size of particles (Col. 6, lines 16-32). The arguments analogous to those presented above for claim 1 are applicable to clam 3.

Regarding claims 4, 35, 62, and 83, Uesugi discloses the particles are generated in fabrication of a semiconductor device and includes a measurement unit that judges whether the relative size of the particles is greater than a predetermined threshold size in order to judge whether the particles would exert harmful influence on a semiconductor device and ceases fabrication if the relative size of the particles has been judged to be greater than a predetermined threshold size (Col. 6, lines 56-67).

Regarding claims 5 and 37, Uesugi discloses a scanner which scans the laser beam emitted from the laser beam source (Col. 7, lines 23-28).

Regarding claim 6, Uesugi discloses the photodetector including a CCD camera comprised of a plurality of light-receiving devices arranged in a matrix (Col. 6, lines 40-50).

Regarding claims 7, 38, 63, and 85, Uesugi discloses including a particle counter (Col. 6, lines 48-50) which counts up each time the particle counter receives a signal from the area detector and transmits a signal indicative of a count to the measurement unit (Col. 6, lines 51-60).

Regarding claims 9, 39, 65, and 86, the arguments analogous to those presented above for claim 1 are applicable to claims 9, 39, 65, and 86. Uesugi discloses a counter which counts the number of pixels detected by the area detector (Col. 6, lines 48-50). Uesugi discloses comparing the number of pixels to a predetermined threshold number to thereby measure a relative size of the particles (Col. 6, lines 51-60).

Regarding claims 15, 43, 69, and 89, the arguments analogous to those presented above for claim 1 are applicable to claims 15, 43, 69, and 89. Note, Yamaguchi discloses calculating a total of brightness of the pixels detected by the area detector and comparing to a threshold to thereby measure a relative size (Col. 19, lines11-19).

Regarding claims 10, 16, 40, 44, 66, 70, 87, and 90, the arguments analogous to those presented above for claim 2 are applicable to claims 10, 16, 40, 44, 66, 70, 87, and 90.

Regarding claims 45 and 91, the arguments analogous to those presented above for claim 4 are applicable to claims 45 and 91.

Regarding claims 11, 19, 41, and 47, the arguments analogous to those presented above for claim 5 are applicable to claims 11, 19, 41, and 47.

Regarding claims 12 and 20, the arguments analogous to those presented above for claim 6 are applicable to claims 12 and 20.

Regarding claims 13, 21, 42, 48, 67, 73, 88, and 93, the arguments analogous to those presented above for claims 13, 21, 42, 48, 67, 73, 88, and 93.

Regarding claims 17 and 71, the arguments analogous to those presented above for claims 1 and 7 are applicable to claims 17 and 71.

Regarding claims 18 and 72, the arguments analogous to those presented above for claims 17 and 15 are applicable to claims 18 and 72.

Regarding claims 49 and 94, Uesugi discloses calculating the size of a particle (Col. 7, lines 14-16) in accordance with the equation of Rayleigh scattering (Col. 6, lines 15-32) and a threshold size to which a calculated size is compared (Col. 6, lines 56-60).

Regarding claims 50 and 95, the arguments analogous to those presented above for claim 30 are applicable to claims 50 and 95.

7. Claims 8, 14, 22, 36, 46, 64, 68, 84, and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over over Uesugi et al. (5,870,189) in view of Yamaguchi et al. (5,929,980) as applied to claims 1, 9, and 15 above, and further in view of Comita et al. (6,368,567).

Regarding claims 8, 14, 22, 36, 46, 64, 68, 84, and 92, Uesugi does not appear to recognize including a heater. However, Comita et al. ("Comita") teaches that it is known to include a heater for heating a chamber to remove by-products from the chamber (Col. 3, lines 22-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the chamber in which the particles are generated as disclosed by

Uesugi to include a heater, as taught by Comita, in order remove wafer processing by-products (Col. 3, lines 23-24).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. No. 5,861,951 to Uesugi et al. for particle monitoring instrument;

U.S. Pat. No. 6,366,690 to Smilansky et al. for pixel based machine for patterned wafers;

U.S. Pat. No. 5,946,092 to DeFreez et al. for dual laser heterodyne optical particle detection technique.

JP 10-232196 to Ito et al. for particle monitor device;

JP 11-44654 to Ito et al. for particle monitor device;

JP 10-10036 to Uesugi et al. for particle monitor device and dust eliminating process device having the monitor device; and

Uesugi et al., *Real-time monitoring of scattered laser light by a single particle of several tens of nanomters in the etching chamber in relation to its status with the equipment*, J Vac Sci Techn. A 16(3), May/Jun 1998, pages 1189-1195.

Contact Information

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon. -Thurs. 8:00 - 5:30 and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

VK
July 24, 2003

AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600